bear the stamp of truth, but it appears certain that no bodies prepared by the method Herodotus describes have been found so far.

According to the *Scientific American* for June 22, the American Government has received thousands of suggestions for the protection of sea-going vessels from attack by submarine. Often the same suggestion is made by many different inventors, the great majority of whom show a lamentable ignorance of the conditions which prevail at sea. Seven devices are illustrated, four of which consist of padding for the hull, which would either increase the resistance of the ship and diminish its speed greatly, or would be carried away by the first heavy sea. Another device deflects the torpedo below the keel, the inventor not appearing to know that it would be fired by the deflection. The other devices are for preventing the sinking of the vessel after she has been struck, and involve either an inner hull or a series of air-bags which can be pumped up and pulled under the side of the vessel struck. Would-be inventors of devices for this purpose might save themselves and the Government Departments much trouble by consulting this article.

Attention may be directed to a very useful article by Dr. P. E. Spielmann in the *Chemical Trade Journal* for July 6 and the three previous issues, giving a summary description of the constituents of coal-tar and their properties. A large number of substances has been found in coal-tar—from three hundred to four hundred, of which about one hundred and fifty have been determined quantitatively and ninety definitely isolated. On a large scale only four are separated as the pure individual substances, namely, benzene, toluene, naphthalene, and phenol, though others, such as xylenes, cresols, and the hydrocarbons of solvent naphtha, are used in considerable quantities in the form of mixtures of their homologues. The article, which is based upon a German account with additions and modifications, is designed to give a general survey of the lesser-known as well as the more valuable substances obtainable. By reason of the exploitation of the coal-tar industry in Germany the minute examination of the constituents of tar has so far been due largely to German chemists. The results obtained are of great value, and it is hoped that detailed and difficult work of this kind will in the immediate future be carried on in this country, since our chemists are fully capable of doing it. In any case, the information collected will prove serviceable.

The first of a series of articles on time studies for rate setting on machine tools appears in *Industrial Management* (*The Engineering Magazine*) for June. The author, Mr. Dwight V. Merrick, has had exceptional opportunities of studying this important subject. Some nineteen years ago he became associated with Dr. Taylor, and for the last fifteen years has specialised on the taking of time studies and the setting of tasks and rates. He also possesses the faculty of setting down in clear, concise style the knowledge he has gained during lengthy investigations, and his articles can be recommended confidently to any who wish to become further acquainted or to make personal experiments with Dr. Taylor's efficiency methods. Full instructions are given for the practical carrying out of time studies and for the analysis of the results. The matters dealt with include:—(*a*) Study of the work and conditions that influence its performance; (*b*) analysis of the work into its elements; (*c*) observing and recording the elapsed time for the performance of each of the elements; (*d*) study and analysis of the records obtained in (*c*); (*e*) determining a just time for the performance of each of the elements; (*f*) preparing from the time-study records an instruction card, including the determining of an allowance for fatigue and unavoidable delays. The first article includes formulæ and a set of interesting graphs giving the "variation allowance," *i.e.* the additions that must be made to the actual sum of the unit times in order to take care of the factors that slow down work. Fatigue is one of the major factors, and its influence is relatively diminished as the percentage of handling time is lessened for the complete cycle of operations. Those interested will find a great deal of valuable practical information in these articles.

Sir William Ramsay before his death had compiled a biography of Dr. Joseph Black, whose fundamental experiments on chemical combination and on heat made a lasting impression on science. This volume, with an introduction by Prof. F. G. Donnan on Sir William Ramsay himself, illustrated by sundry reproductions and portraits, is now in the press, and will be published by Messrs. Constable. Besides an account of Dr. Black's life and work, there are some of his letters and descriptions of academic life in Glasgow and Edinburgh of the eighteenth century.

Messrs. J. Wheldon and Co., 38 Great Queen Street, W.C.2, have shown enterprise in issuing a catalogue, called by them a "War Economy" catalogue, of books relating to botany likely to be of especial interest and service at the present time. It contains some 2000 items, arranged conveniently under the headings of Agriculture, Husbandry, and Gardening (general subjects), Cereals and Bread, the Flower Garden, Forestry, Timber, etc., Fruit and Fruit Trees, Grape Vine, etc., Grasses and Forage Plants, Herbals, Hybridity, Heredity, etc., Orchids, Vegetable Gardening, Economic Botany, and Medical Botany. It will doubtless appeal to many readers of Nature. Copies are obtainable from Messrs. Wheldon for the sum of twopence.

OUR ASTRONOMICAL COLUMN.

The New Star in Aquila.—The decline of the new star appears to be proceeding very slowly, the brightness on July 27 being still about equal to that of the neighbouring 4th magnitude star θ Serpentis. The visual spectrum, as observed by Prof. Fowler, has shown but little change during the past fortnight. The bright lines of hydrogen and the band λ 464 were very conspicuous throughout this period when observations were possible, and the green line about λ 501, which is possibly identical with the chief nebular line, was of nearly the same brightness as H_β. Three fainter lines in the yellow, about $\lambda\lambda$ 588, 576, and 568, also remained visible.

The General Magnetic Field of the Sun.—The results of a further investigation of the Zeeman effects due to the general magnetic field of the sun have been given by Messrs. Hale, Seares, Van Maanen, and Ellerman (*Astrophys. Journ.*, vol. xlvii., pp. 206–54). The photographs were taken in the third order of the 75-ft. grating spectrograph in connection with the 150-ft. tower telescope at Mount Wilson. With the aid of suitable polarising apparatus the observations are reduced to the measurement of line displacements, but these are so minute, and the lines so wide in comparison with their shifts, that definite evidence of the reality of the displacements has been established only after very great labour. It is satisfactory to find, however, that the twenty-six additional lines which

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have been observed to give measurable displacements confirm the earlier results, and seem to place beyond reasonable doubt the conclusion that the sun behaves approximately as a uniformly magnetised sphere, with a polarity corresponding with that of the earth. The deduced values of the field-strength in Gaussian units at the sun's magnetic pole range from 9·9 to 54·7, but it is shown that, in general, the values corresponding with a given line-intensity are approximately equal. For iron and chromium, at least, there is a rapid decrease in field-strength with increasing line-intensity, and, in view of Mr. St. John's conclusion that lines of increasing intensity represent successively higher levels in the solar atmosphere, it would appear that the strength of the sun's general field falls off rapidly with increasing elevation above the surface. The part of the field at present accessible to observation lies within the bounding surfaces of a thin shell in the solar atmosphere about 150 km. in thickness. The anomalous behaviour of certain lines which fail to show displacements has not yet been completely explained, but the lines in question may possibly originate outside the effective field.

THE SPECTROSCOPIC BINARY BOSS 1082.—This star, of magnitude 5·3 and type G5, was found to have a variable velocity by the observers at Mount Wilson. The orbit has now been computed by Mr. J. B. Cannon from forty-two photographs of the spectrum taken at the Dominion Observatory, Ottawa, during the years 1916, 1917, and 1918 (Journ. R.A.S. Canada, vol. xii., p. 210). The elements of the orbit, with their probable errors, are as follows:—

$$\mathrm{P}=121\ \text{days}$$
$$\mathrm{K}=28{\cdot}19\ \text{km.}\quad \pm 1{\cdot}2\ \text{km.}$$
$$e=0{\cdot}019\quad \pm 0{\cdot}042$$
$$\omega=285^{\circ}\quad \pm 42{\cdot}68^{c}$$
$$\gamma=-40{\cdot}47\ \text{km.} \pm 0{\cdot}81\ \text{km.}$$
$$\mathrm{T}=\text{J.D. } 2{,}421{,}137{\cdot}55 \pm 14{\cdot}26\ \text{days}$$
$$a \sin i=46{,}900{,}000\ \text{km.}$$
$$\frac{m_1^3 \sin^3 i}{(m_1+m)^2}=0{\cdot}28 \times \text{sun}$$

MARINE BIOLOGY IN THE UNITED STATES.

UNDER the direction of Dr. A. G. Mayer, the Department of Marine Biology of the Carnegie Institution of Washington continues to carry out researches of great value, and vol. xii. of the Papers from the department, issued March, 1918, fully maintains the high standard of previous volumes. From the point of view of general interest, perhaps the most striking paper is Mr. E. W. Gudger's account of the habits of the gaff-topsail catfish (*Felichthys felis*), a large catfish which is found at Beaufort, North Carolina. In this species the ova, which are very large, being as much as 1 in. in diameter, are carried in the mouth of the male parent until the larvæ are hatched, and the young are retained in this situation for some considerable time until the yolk-sac has been absorbed. The largest number of eggs found in the mouth of any one male was fifty-five, and numbers above twenty were quite frequent. The habit of oral gestation in catfishes of various species and from many different geographical regions has, of course, long been known, but the carefully ascertained details recorded in the present paper will be much appreciated by field naturalists.

Mr. Gudger also contributes a memoir on the Barracuda (*Sphyraena barracuda*), a well-known West Indian fish of fierce and voracious habits, which is much used as a food-fish. In the course of this memoir considerable space is devoted to a discussion of the occasionally poisonous character of this fish. As is well known to West Indian residents, although the flesh is generally a perfectly wholesome article of diet, occasional specimens are met with which when eaten cause serious illness, with symptoms which are considered distinct from those of ptomaine poisoning. Although the author has been at some pains to collect all the literature dealing with this poisoning, he has failed to find any modern scientific account by a medical writer, and it would appear to be a matter which calls for a thorough investigation by those interested in tropical disease. The fact of the occurrence of these cases has been quite familiar to medical practitioners in the West Indies for many years, but, judging from the information in the present memoir, little progress has been made in discovering the cause of the trouble.

Another paper dealing with fishes is one by Mr. C. F. Silvester on fishes new to the fauna of Porto Rico. As a result of a three weeks' visit to the island the author obtained eight species which he regards as new to science, and the present communication is devoted largely to a detailed description of these, illustrated by excellently coloured figures.

Miss E. G. White deals with the origin of the electric organs in *Astroscopus guttatus*, and gives a valuable survey, with a very complete bibliography, of the whole question of the electric organs of fishes, which should be very useful to anyone seeking information on this subject.

Dr. Mayer himself contributes two short papers of considerable importance. The first describes a series of experiments on toxic effects due to high temperature, in which a number of reef-corals were kept in warm ocean-water for sixty minutes in the dark, and the temperature was found which was just sufficient to kill the coral. The author concludes that "it seems possible that death from high temperature may be due to the accumulation of acid (possibly H_2CO_3) in the tissues, the rate of formation of this acid being related to the rate of metabolism of the tissues. Thus animals of the same class having a high rate of metabolism, as measured by oxygen consumption, are more sensitive to heat and to CO_2 than those having a low rate of metabolism." Dr. Mayer's second paper is a short note, in continuation of previous work, on nerve-conduction in diluted and in concentrated sea-water, the Scyphomedusa (*Cassiopea xamachana*) being the animal used in the experiments, and the salinities employed ranging from 18·13 to 60·96 per thousand.

Mr. J. F. McClendon writes an important paper on "Changes in the Sea and their Relation to Organisms." Adopting the most refined modern methods of analysis, he has studied a number of physical and chemical problems which have a direct bearing on the life of the plants and animals of the sea. Amongst the problems dealt with are ocean currents, oxygen tension in sea-water, and the chemical precipitation of calcium carbonate in sea-water, his observations on the last-named being particularly suggestive.

Mention must also be made of Mr. S. C. Ball's observations on the migration of insects to the Rebecca Shoal light-station, an isolated station 105 miles from the mainland of Florida and 95 miles from the coast of Cuba. Mosquitoes and house-flies are the insects chiefly discussed, and some striking figures are given which have an important bearing on the problem of insect migration. Other papers are on amphibians and reptiles from Porto Rico and the Virgin Islands by H. W. Fowler, and on the botanical ecology of the dry Tortugas by H. H. M. Bowman. Dr. Mayer is to be congratulated upon a most interesting and important volume.

E. J. A.

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